

### **A device for dispensing a fluid product**

This present invention concerns a device for the dispensing of a fluid product, and more particularly a device of the aerosol type, including a non-metering dispensing valve  
5 and an external metering system mounted on the said valve.

In systems of the aerosol type, it is common to use valves to dispense the product by means of a propellant. These valves can be metering valves, which dispense accurately metered quantities with each operation. These valves are quite  
10 complex to manufacture and to assemble, in particular when one requires to guarantee optimal metering accuracy. Likewise, the use of a metering valve considerably complicates the filling of the reservoir with the fluid product and the propellant, which also increases the costs. Moreover, in a metering valve,  
15 the metering chamber is generally filled just after dispensing the preceding quantity, so that in the event of an extended period of storage, the latter takes place with the chamber full. Furthermore, non-metering or continuous valves which dispense the product for as long as the valve stem is kept in  
20 its dispensing position, which is generally in the pressed position, are not suitable for a certain number of products, such as pharmaceutical products for example. These non-metering valves, which are very simple to manufacture and to assemble, and which allow very easy filling of the reservoir,  
25 therefore do not allow quantities of product to be dispensed in a precise manner.

Documents FR 1 325 336, US 4 915 262 and JP 2000/084444 describe push-button metering devices capable of being fitted to a continuous valve. These push-button devices are  
30 complicated, composed of many parts, and therefore costly to manufacture and to assemble.

This present invention has as its aim to supply a fluid-product dispensing device which does not have the aforementioned disadvantages.

More particularly, this present invention has as its aim  
5 to provide a fluid-product dispensing device which allows the dispensing of accurate and repeatable quantities of the product contained within the reservoir.

In particular, this present invention has as its aim to supply a fluid-product dispensing device which guarantees both  
10 easy and simple filling, and accurate and repeatable dispensing, of the product contained in the reservoir.

This present invention also has as its aim to provide such a device in which the metering chamber is filled just before expulsion of the metered quantity.

15 This present invention also has as its aim to supply such a device which is simple and inexpensive to manufacture, to assemble and to use.

This present invention therefore has as its subject a fluid-product dispensing device that includes a reservoir  
20 containing a fluid product and a propellant, with a non-metering dispensing valve being mounted on the said reservoir, the said valve including a valve stem that is movable between a closed position and an open position, the said valve being designed to dispense fluid product for as long as the valve  
25 stem is kept in the open position, with the device also including a dispensing head mounted on the said valve stem and including a dispensing orifice, characterised in that the said head includes a metering system designed to dispense a precise and repeatable metered quantity of fluid product with each  
30 operation of the device.

Advantageously, the said metering system includes a control element to move the said valve stem between its closed and open positions, and a metering element which is movable in relation to the said control element between a shut-off  
5 position and a dispensing position.

Advantageously, the said metering system includes an operating element, to move the said control element and the said metering element.

Advantageously, the said operating element fits onto the  
10 said control element by means of an elastic element, such as a spring whose stiffness is greater than the force necessary to move the valve stem, so that at the start of the operation, the operating element, the control element and the metering element all move together as a static unit.

Advantageously, when the control element is in abutment,  
15 with the valve stem in the open position, product is fed into the said dispensing head, with the metering element, in the shut-off position, preventing any dispensing of this product.

Advantageously, when the control element is in abutment,  
20 with the valve stem in the open position, continuation of the operating element on its operating trajectory gives rise to a deformation of the said elastic element placed between the operating element and the control element, and therefore a movement of the said operating element and of the said  
25 metering element in relation to the said control element.

Advantageously, when the metering element moves in relation to the control element, it first arrives at a metering position, in which it shuts off, in a sealed manner, a passage to the said valve stem, thus determining the volume  
30 of the metered quantity, and then at a dispensing position, in which the said metered quantity is dispensed through the said dispensing orifice.

Advantageously, a control element is hollow and forms, at least partially, a metering chamber and a feed passage between the said metering chamber and the said valve stem, the said metering element including a first gasket forming, together  
5 with the said feed passage, an entry valve for the metering chamber, and a second gasket forming, together with the metering chamber, and exit valve from the metering chamber.

Advantageously, during operation, the said entry valve closes before opening of the said exit valve, and after  
10 operation, the said exit valve closes again before opening of the said entry valve.

Advantageously, the said first gasket is annular and fits onto the walls of the feed passage in the closed position of the entry valve, where the said passage and/or the said  
15 metering chamber include walls of larger diameter fitting the said first gasket in the open position of the said entry valve.

Advantageously, the said second gasket is annular, and fits onto the walls of the said metering chamber in the closed  
20 position of the exit valve, the said metering chamber including walls of larger diameter fitting with the said second gasket in the open position of the said exit valve.

Advantageously, the said operating element is snapped onto the said control element.

25 Advantageously, the control element contains a metering chamber, the said metering element simultaneously forming the entry valve and exit valve of the said metering chamber.

Other characteristics and advantages of this present invention will appear more clearly on reading the following  
30 detailed description of one particular embodiment of the

latter, with reference to the attached drawings, given by way of non-limited examples, and in which :

5       - figure 1 is schematic view in cross section of a fluid-product dispensing device according to this present invention, in the rest position,

      - figure 2 is a view similar to that of figure 1, at the start of the operation, in the position for loading of the metered quantity,

10       - figure 3 is a view similar to that of figures 1 and 2, during operation, in the position for isolation of the metered quantity,

      - figure 4 is a view similar to that of figures 1 to 3, in the position for expulsion of the metered quantity, and

15       - figure 5 is a view similar to that of figures 1 to 4, with the device returning to the rest position after expulsion of the metered quantity.

      The drawings, which represent one advantageous embodiment of this present invention, show a fluid-product dispensing device that includes a reservoir 10 on which is mounted a continuous valve, also known as a non-metering valve 20, by means of a crimped-on capsule 15 for example. The operation of a continuous non-metering valve is very simple, since in the rest position represented in figure 1, the valve is closed and the contents of the reservoir 10 are isolated, while when in the dispensing position, with the valve stem pressed fully down, product is dispensed.

      In order to achieve accurate metering of the product quantity dispensed with each operation, the device according to the invention specifies a metering system 32, 33, 34, 35, created in a dispensing head 30 which is mounted on the valve

stem of the valve 20. This metering system acts during the operation of the device, and ensures that the same metered quantity is dispensed with each operation, independently of the position of the valve stem of the continuous valve 20. In the example represented in the drawings, the metering system includes a control element 32 which is designed to move the valve stem of the valve between its closed and open positions. The control element 32 is preferably hollow and includes within it a metering element 33 which is movable in relation to the said control element 32 between a shut-off position represented in figures 1 and 2 and a dispensing position represented in figure 4. An operating element 34, to which the user applies force during the operation, fits onto both the control element 32 and the metering element 33 to move these during the operation. As can be seen in the figures, an elastic element, such as a spring 35, is preferably placed between the operating element 34 and the control element 32. The stiffness of this spring 35 is greater than the force necessary to move the valve stem of the valve 20, so that at the start of the operation, it is the valve stem of the valve 20 which is first pressed fully down while the spring 35 does not deform. At the start of the operation, the control element 32, the operating element 34 and the metering element 33 therefore move together forming a static unit. This movement is shown in figure 2. In the position represented in figure 2, the control element 32 has therefore moved the valve stem of the valve 20 to its open position. At that instant, product is expelled by the said valve stem 20. The control element 32, which is hollow, forms a metering chamber 50 which is connected firstly to a dispensing orifice 31 and secondly to the output of the valve stem 20 by means of a feed passage 40.

The metering element 33, which is movable in relation to the control element 32, is used to shut off the said feed

passage 40 to allow a metered quantity to be loaded, and to open the output of the metering chamber 50, to allow the expulsion of the product through the dispensing orifice 31. As can be seen in figure 2, when the control element 32 arrives at the end of its travel on the fixing capsule 15, the feed passage 40 is open into the metering chamber 50, while this metering chamber 50 is isolated from the dispensing orifice 31. At that instant, the product is therefore fed into the metering chamber 50, filling it. There is no expulsion of product through the dispensing orifice 31, since the passage to this orifice is closed. When the user continues pressure on the operating element 34, this then deforms the spring 35, which gives rise to the movement of the metering element 33 within the control element 32. As can be seen in figure 3, the feed passage 40 is then firstly closed in relation to the metering chamber 50, which totally isolates the metered quantity within the metering chamber. This metering position is used to determine the volume of this metered quantity in a very precise and repeatable manner. Finally, continuation of the operating trajectory of the operating element 34 moves the metering element 33 still further. As represented in figure 4, the metering element 33 then opens the passage between the metering chamber 50 and the dispensing orifice 31, and thus allows the product to be dispensed. After expulsion of the product, when the user releases pressure on the operating element 34, the spring 35 and the spring of the valve stem 20 return the metering system to its rest position. During this return to the rest position, the metering element 33 first closes the connection between the metering chamber 50 and the dispensing orifice 31 before again opening the feed passage 40 to allow the loading of a fresh metered quantity.

The preferred embodiment represented in the figures includes a metering element 33 fitted with a first gasket 36

forming, together with the said feed passage 40, an entry valve for the metering chamber 50, as well as a second gasket 37 which forms, together with the metering chamber 50, an exit valve from the metering chamber 50. As described above, during the operation, the entry valve closes before opening of the exit valve, and after operation, when the device returns to its rest position, the exit valve closes again before opening of the entry valve. Advantageously, the first gasket 36 is annular and fits onto a wall of the feed passage 40 in the closed position of the entry valve, the said gasket 36 being placed within the metering chamber 50 when the entry valve is in the open position. In a variant, one could envisage that in the open position, the first gasket 36 fits onto a wall part of larger diameter than the said feed passage 40. Furthermore, the second gasket 37 is also advantageously annular, and fits onto the walls of the metering chamber 50 in the closed position of the exit valve, with the said metering chamber 50 having walls of larger diameter which fit onto the said second gasket 37 in the open position of the exit valve. This open position of the exit valve is shown in figure 4, with a very slight difference in the diameter being sufficient to allow the metered product quantity to be expelled, in particular by the presence of a propellant gas.

Advantageously, it is possible to arrange for an atomising profile not shown at the level of the dispensing orifice 31, in order to favour dispensing in the form of a spray. The operating element 34 is shown as being click-fitted or snapped on the control element 32, but it is intended that any other means of attaching these various elements can be envisaged.

The invention has been described with reference to one particular embodiment of the latter, but it is clear that it is not limited to the example represented. In particular, the



arrangement of the various elements forming the metering system operating element, elastic element, control element, and metering element can differ, and these various elements can be implemented in a different fashion, on condition that  
5 it adequately performs the metering function during the operation of the device. In particular, the position and the shape of the gaskets formed on the metering element 33 can be implemented in any manner desired. Likewise, the shape of the entry and exit valves of the metering chamber can also be  
10 implemented in any manner desired.

One obvious advantage of this present invention is that it allows implementation of a metering system, and therefore the dispensing, in an accurate and repeatable manner, of the product contained in the reservoir 10, while still using a  
15 non-metering valve. Moreover, the filling of the metering chamber occurs advantageously just before expulsion of the metered quantity. The use of a non-metering valve has many advantages, in particular regarding the manufacturing and assembly costs. It also simplifies the filling of the  
20 reservoir with the product and the propellant gas, to a very significant degree. Someone skilled in the art will also be able to perform all necessary changes to this present invention as described above, without moving outside the scope of the present invention as described in the appended claims.

## 25       **Claims**

1.       A fluid-product dispensing device that includes a reservoir (10) containing a fluid product and a propellant, with a non-metering dispensing valve (20) being mounted on the said reservoir (10), and with the  
30 said valve (20) including a valve stem which is movable between a closed position and an open position, the said valve (20) being designed to dispense a fluid product for

as long as the valve stem is kept in the open position, the device also including a dispensing head (30) mounted on the said valve stem (20) and including a dispensing orifice (31), characterised in that the said head (30) includes a metering system (32, 33, 34, 35) designed to dispense a precise and repeatable metered quantity of fluid product with each operation of the device.

2. A device according to claim 1, in which the said metering system (32, 33, 34, 35) includes a control element (32) to move the said valve stem (20) between its closed and open positions, and a metering element (33) that is movable in relation to the said control element (32) between a shut-off position and a dispensing position.

3. A device according to claim 2, in which the said metering system (32, 33, 34, 35) includes an operating element (34) to move the said control element (32) and the said metering element (33).

4. A device according to claim 3, in which the said operating element (34) fits onto the said control element (32) by means of an elastic element (35), such as a spring, whose stiffness is greater than the force necessary to move the valve stem (20), so that at the start of the operation, the operating element (34), the control element (32) and the metering element (33) move together as a static unit.

5. A device according to claim 4, in which, when the control element (32) is in abutment, with the valve stem (20) in the open position, product is fed into the said dispensing head (30), with the metering element (33), in the shut-off position, preventing any dispensing of this product.

6. A device according to claim 4 or 5 in which, when the control element (32) is in abutment, with the valve stem (20) in the open position, continuation of the operating element (34) on its operate trajectory gives rise to a deformation of the said elastic element (35) placed between the operating element (34) and the control element (32), and therefore a movement of the said operating element (34) and of the said metering element (33) in relation to the said control element (32).

7. A device according to claim 6 in which, when the metering element (33) moves in relation to the control element (32), it first arrives at a metering position in which it shuts off, in a sealed manner, a passage (40) to the said valve stem (20), thus determining the volume of the metered quantity, and then at a dispensing position, in which the said metered quantity is dispensed through the said dispensing orifice (31).

8. A device according to any of claims 2 to 7, in which the control element (32) is hollow and forms, at least partially, a metering chamber (50) and a feed passage (40) between the said metering chamber (50) and the said valve stem (20), with the said metering element (33) including a first gasket (36) forming, together with the said feed passage (40), an entry valve for the metering chamber (50), and a second gasket (37) forming, together with the metering chamber (50), an exit valve from the metering chamber (50).

9. A device according to claim 8 in which, during operation, the said entry valve closes before opening of the said exit valve, and after operation the said exit valve closes again before opening of the said entry valve.

10. A device according to claim 8 or 9, in which the said first gasket (36) is annular and fits onto the walls of the feed passage (40) in the closed position of the entry valve, with the said passage (40) and/or the said metering chamber (50) including walls of larger diameter fitting onto the said first gasket (36) in the open position of the said entry valve.

11. A device according to any of claims 8 to 10, in which the said second gasket (37) is annular and fits onto the walls of the said metering chamber (50) in the closed position of the exit valve, with the said metering chamber (50) including walls of larger diameter fitting against the said second gasket (37) in the open position of the said exit valve.

12. A device according to any of claims 3 to 11, in which the said operating element (34) is snapped onto the said control element (32).

13. A device according to any of claims 2 to 12, in which the control element (32) contains a metering chamber (50), with the said metering element (33) simultaneously forming the entry valve (36) and exit valve (37) of the said metering chamber (50).